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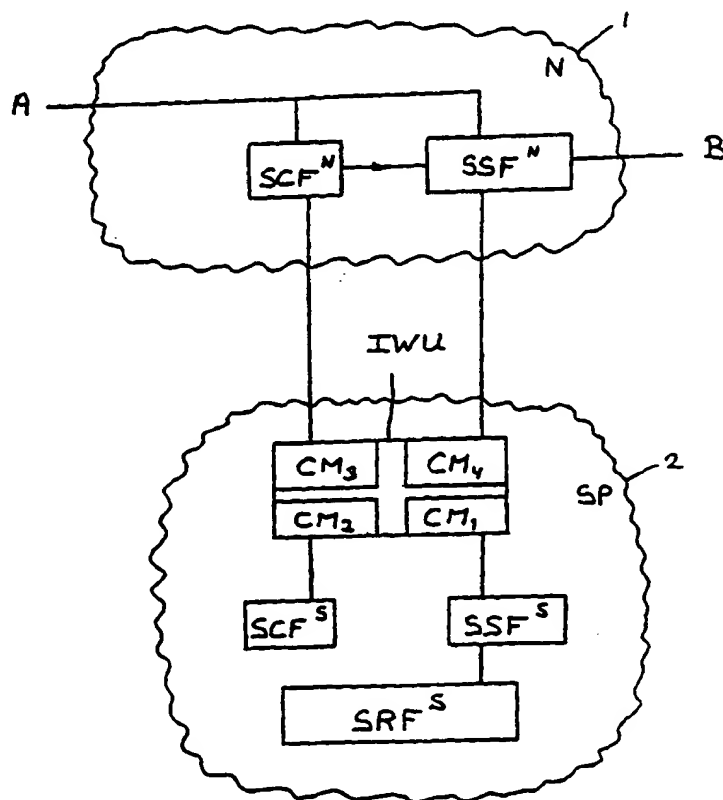
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## (57) Abstract

An infrastructure for telephony is described, comprising a network (n) and a service provider (SP) coupled thereto. The network comprises a service switching function (SSF<sup>N</sup>) as well as a service control function (SCF<sup>N</sup>) for controlling said service switching function. The service provider comprises a service switching function (SSF<sup>S</sup>) as well as a service control function (SCF<sup>S</sup>) for controlling said service switching means. The service provider comprises an inter-working unit (IWU). In communication with a service switching function (SSF<sup>S</sup>) of the service provider, the inter-working unit (IWU) behaves as service control function. In communication with a service control function (SCF<sup>S</sup>) of the service provider, the inter-working unit (IWU) behaves as service switching function. In communication with the network, the inter-working unit (IWU) behaves as special resource point (SRP).



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## MEDIATION OF TRAFFIC IN AN INTELLIGENT NETWORK

In general, the present invention is related to an infrastructure for data transmission, in particular an infrastructure for communication. More in particular, the present invention is related to an infrastructure for telephony, for which reason the present invention will be explained below specifically for this exemplary embodiment with reference to the drawing, in which equal reference signs denote equal or similar parts, and in which:

Figs. 1 to 3 inclusive schematically illustrate communication infrastructures according to the prior art;

Fig. 4 schematically illustrates a communication infrastructure according to the present invention;

Figs. 5 and 6 are flowcharts which illustrate a sequence of communication in the communication infrastructure according to the present invention.

In the discussion below use will be made of concepts and abbreviations which are customary in this field; for a better understanding of these concepts and abbreviations, reference is made to the following publicly available publications:

1) Terms and Definitions, Abbreviations and Acronyms - Recommendations on Means of Expression (Series B), Blue Book Volume I, Fascicle I.3, ITU-T, Geneva, 1988.

2) Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol Specification, ETSI, ETS 300 374-1, September 1994.

3) Intelligent Network (IN); Interface Recommendation for Intelligent Network CS-1, ITU-T, Recommendation Q.1218, October 1995.

4) Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol Specification, ETSI, draft EN 301 140-1 V1.1.1, March 1998.

5) Intelligent Network (IN); Interface Recommendation for Intelligent Network CS-2, ITU-T, Draft Recommendation Q. 1228, April 1997.

Fig. 1 is a functional block diagram which schematically illustrates a conventional network 1 for telephony. Such a network, which is known in the prior art, has many connection points at which users or subscribers can be connected. At a first connection 11, a first subscriber A is connected to the network, and at a second connection 12 a second subscriber B is connected to the network. At the request of the first or calling subscriber A, a connection is established

between said first subscriber A and the second or called subscriber B if certain conditions have been satisfied. Said network 1 thereto comprises switching means 20 for establishing a connection between a calling subscriber and a called subscriber, as well as control means 5 21 for controlling said switching means 20. The first connection 11 is connected to an input of the switching means 20 and to an input of the control means 21. The first subscriber A transmits a request to said control means 21 (for example by entering the desired subscriber number), and the control means 21 examine the validity of the request 10 and, upon proven validity, instruct the switching means 20 to establish a connection between A and B.

The infrastructure illustrated in Fig. 1 is the classical infrastructure, which consists exclusively of the said network, and in which the facilities offered to the users are dependent only upon 15 decisions of the network operator. A more recent development of an infrastructure is illustrated in Fig. 2. In this case, at a connection 13, a service platform 2, of which the owner is in general denoted by the term "service provider", is connected to said network 1 in a manner which is similar to the manner in which a subscriber is 20 connected to said network 1. The service provider, who usually not the same as the network operator, offers extra services to the subscribers of said network 1 by means of said service platform 2.

Such an extra service, for example, is speech recognition. The present invention shall be explained more specifically below for this 25 exemplary embodiment, but it shall be clear that the present invention is equally applicable for other services.

The calling subscriber A is first connected to the service platform 2, so that the calling subscriber A can supply his spoken command, of the 30 type "connect me to B", to said service platform 2. Said service platform 2 can interpret the received command, and reconnects the calling subscriber A to said network 1, transmitting an accompanying understandable command for said network 1 (a translation, as it were, of the spoken command of said calling subscriber A) to establish the 35 desired connection with the called subscriber B.

A disadvantage of the implementation illustrated in Fig. 2 is that the actual connection between the two subscribers A and B runs via said service platform, as indicated by the loop 14. This means that, during the full length of the call, not only a connection between the calling 40 subscriber A and said network 1, as well as a connection between said network 1 and the called subscriber B, is engaged, but that two connections (forward and back, mutually connected via said loop 14)

between said network 1 and said service platform 2 are also engaged. This makes this infrastructure relatively expensive, and entails a substantial impairment of the service provider's capacity. After all, as long as the established connection continues to exist, the service provider is unable to use the two connections between network 1 and the service platform 2, as well as the components involved in the loop connection 14 within said service platform 2, for other purposes, while on the other hand the aid of the service provider is actually only required for establishing the connection and not for maintaining the connection.

There are also systems in the prior art in which the connection between the two subscribers A and B runs via said network 1 only, and not via said service platform 2. Two such existing structures will be explained below with reference to Fig. 3.

For the sake of convenience, the term "service provider (SP)" will also be used below instead of the term "service platform". Further, a component which is present in the network will be denoted by a name or abbreviation with the addition of the exponent N; a service provider component which is present will be denoted in a similar manner by an exponent S.

Fig. 3, like Fig. 4, is a functional diagram illustrating the sequence of and the transition to various functions of the network N and the service provider SP. The network 1 has a service switching function  $SSF^N$  and a service control function  $SCF^N$  for controlling the service switching function  $SSF^N$ . Said service provider 2 has at least one  $SCF^S$ . In the existing structure as illustrated in Fig. 3, the voice command of the calling subscriber A is transferred to the service provider SP in a similar manner as described above with respect to Fig. 2. Within the service provider SP, the voice commands of the calling subscriber A are received, interpreted and assessed. On the basis of said commands the service provider SP subsequently issues a command to certain parts within the network 1, whereby the connection between the two subscribers A and B is directly established. Thereafter, a connection between the network 1 and the service provider SP for maintaining the voice connection between the two subscribers A and B is no longer required, so that the capacities of the service provider SP can be used for building up a following call and/or supplying a subsequent service.

A first variant of this prior art system is implemented in such a manner that an  $SCF^S$  can issue a control command to an  $SSF^N$  (17a) directly. This has the substantial disadvantage of the network operator losing control, at any rate in part, over his network, so

that he can no longer guarantee the integrity of his network.

A second variant of the above-mentioned system is implemented in such a manner that an SCF<sup>S</sup> transmits an instruction to an SCF<sup>N</sup> (17b), which subsequently controls the switching function SSF<sup>N</sup>. With respect to the

5 first-mentioned variant this system admittedly has the advantage that the integrity of said network 1 is better guaranteed, since the switching function SSF<sup>N</sup> is controlled only on the basis of commands which are generated within the network, namely by the SCF<sup>N</sup>, and in principle the network operator himself can determine whether

10 "unwarranted" control commands are issued to the SSF<sup>N</sup>. A disadvantage, however, is that at the SCF<sup>N</sup> information must be present regarding the privileges of the SCF<sup>S</sup>, and that the SCF<sup>N</sup> must fulfil a policing function to check commands originating from the SCF<sup>S</sup>. It is further a disadvantage that this structure is rigid in the sense that if the

15 service provider, for example, wishes to introduce a new service, this is only possible after consultation and agreement between the service provider and the network operator, since the introduction of a new service must be accompanied by new information being present at the SCF<sup>N</sup>.

20

The present invention seeks to eliminate the above-mentioned disadvantages or at least alleviate them.

More in particular, the present invention seeks to provide an infrastructure for communication comprising a network with subscriber

25 connections and a service provider connected to the network, in which on the one hand the integrity of the network is guaranteed but, on the other hand, the service provider has the possibility of adding or changing services without having to consult with the network operator.

30 According to an important aspect of the present invention a generic set of instructions is present at the SCF<sup>N</sup>, and the service provider SP is set up to function as a Special Resource Point SRP.

Fig. 4 diagrammatically shows a functional block diagram of the infrastructure according to the present invention. The service

35 provider SP comprises an inter-working unit IWU, coupling the service provider SP and the network N. More in particular, the IWU within the domain of the service provider is coupled to an SSF<sup>S</sup> and an SCF<sup>S</sup>, while the IWU is externally coupled to an SSF<sup>N</sup> and an SCF<sup>N</sup> of the network.

40 More in particular, the IWU comprises:

a first functional interface CM<sub>1</sub> between the IWU and an SSF<sup>S</sup>; a second functional interface CM<sub>2</sub> between the IWU and an SCF<sup>S</sup>; a third

functional interface CM<sub>3</sub> between the IWU and an SCF<sup>N</sup>; a fourth functional interface CM<sub>4</sub> between the IWU and an SSF<sup>N</sup>.

With respect to the term "functional interface" it is remarked that this refers to the interaction between different functions. For

5 example, it may refer to a communication protocol.

It is further remarked that the communication within the network N as well as the communication from and to the network N takes place via protocols which are associated with an Intelligent Network as defined in the publications referred to in the introduction. The manner in

10 which the various parts within the domain of the service provider SP communicate with each other, however, is unrestricted. The service provider SP can choose to set up his own domain as an Intelligent Network, and to use the related standardised protocols, but said service provider SP can also choose to use another structure and/or

15 other protocols. As shall become clear from the description below, the choice of the service provider SP in this regard has no influence on the functioning of the present invention. Although the terminology SCF, SSF, SRF etc. in the publications referred to in the introduction is defined in conjunction with an Intelligent Network and the related

20 standardised protocols, the terminology SCF<sup>s</sup>, SSF<sup>s</sup>, SRF<sup>s</sup> etc. will be used below to refer both to the functions defined in the said publications and to functions similar thereto, and the interfacing between said functions shall not be limited to the protocols defined in said publications.

25

The first functional interface CM<sub>1</sub> is such that, in the communication with the SSF<sup>s</sup>, the IWU behaves as an SCF. Seen from the SSF<sup>s</sup>, the IWU thus has, as it were, an SCF face.

The second functional interface CM<sub>2</sub> is such that, in the communication

30 with the SCF<sup>s</sup>, the IWU behaves as an SSF; seen from the SCF<sup>s</sup> the IWU thus has, as it were, an SSF face.

It is remarked that, in the example described here, the SSF<sup>s</sup> has a transfer function for the exchange of messages between the SCF<sup>s</sup> and the SRF<sup>s</sup>. The present invention, however, is not restricted to such an

35 implementation: for the exchange of messages between the SCF<sup>s</sup> and the SRF<sup>s</sup> other implementations are also possible which, however, will not be explicitly described here.

The third and fourth functional interfaces CM<sub>3</sub> and CM<sub>4</sub> of the IWU are such that, in the communication with the network N, the IWU behaves as

40 an SRP; seen from the network the IWU of the service provider thus has, as it were, an SRP face. Since special resource points SRP are known per se, the functioning thereof will not be further explained

here.

- A first advantage of the infrastructure proposed by the present invention is that the functions SCF<sup>s</sup> and SSF<sup>s</sup> of the service provider SP are not required to be standard functions, and that the communication between these functions and the IWU may run via an arbitrary protocol which can be defined by the service provider himself; in this regard it is only important that the functions within the service provider "understand each other". As far as the communication between the network N and the service provider is concerned, the IWU functions as an interpreter, in such a manner that the communication between the IWU and the other parts of the service provider takes place via the said arbitrary protocol, while the communication between the IWU and the network is carried out on the basis of pre-established standard protocols. In this regard it is remarked that, after suitable processing, the IWU in fact forwards each arriving message, and that no memory is required in the IWU to store the status of calls. This implies that the IWU can be a relatively cheap unit.
- In the SCF<sup>N</sup>, a generic service logic functions which is independent of the service(s) provided by the service provider SP, which forms part of the agreements between the network operator and the service - provider, and which is controlled by the network operator. The IWU and thereby the SCF<sup>S</sup>, can only use pre-determined generic instructions which form part of said generic service logic; the generic instructions from said generic service logic which are available to the IWU are also controlled by the network operator. For this reason it is not possible, whether on purpose or not, to issue erroneous or undesired instructions from the service provider to the network, so that the integrity of the network is guaranteed.
- Although the said generic instructions are pre-determined by the network operator and are made available to the service provider, the service provider is not obliged to actually use all said instructions. The set of generic instructions is available to the service provider and the service provider can make a selection from it when establishing a service package. Therefore, by simply using more instructions from the set of generic instructions, the service provider can change his service package in a simple manner without the necessity of consulting with the network operator.
- By way of example, the messages exchanged between the various parts of the network and of the service provider will now be explained with reference to the diagram of Fig. 5. This example is related to the



service "dialling by means of voice control".

In a first step, the SSF<sup>N</sup> detects the occurrence of a triggering event, for example the reception of an initiating signal from the calling subscriber A. The SSF<sup>N</sup> then transmits an InitialDP message to the SCF<sup>N</sup>.

- 5 In a second step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to establish a temporary connection with the IWU (via the functional interface CM<sub>4</sub> thereof), as if it were an SRF.

- 10 In a third step, the SSF<sup>N</sup> establishes a temporary connection with the IWU via functional interface CM<sub>4</sub>, after which the IWU transmits a setup message to the SSF<sup>S</sup> via functional interface CM<sub>1</sub>.

- In a fourth step, the SSF<sup>S</sup> responds by transmitting an InitialDP message to the IWU via functional interface CM<sub>1</sub>. In this case the parameters present in the InitialDP message are not significant, since said message serves only for stopping the call setup process in the

- 15 SSF<sup>S</sup> in order to make the SSF<sup>S</sup> wait for instructions from the SCF<sup>S</sup>.

In a fifth step the IWU, via functional interface CM<sub>3</sub>, requests instructions from the SCF<sup>N</sup>.

- The SCF<sup>N</sup> then, in a sixth step, issues instructions to the IWU. This may take place, for example, by means of the DisplayInformation parameter in a PromptAndCollectUserInformation message. The information in said parameter is an IA5 string, of which the contents conform to previously reached agreements between the network operator and the service provider. In this example the information comprises a combination of ,inter alia, the telephone number of the calling
- 20 subscriber A, the telephone number of the called subscriber B, and command-related information such as ServiceKey, DetectionPoint, and so on. It concerns the information which the SCF<sup>N</sup> received from the SSF<sup>N</sup> with the InitialDP message in the first step.

- In a seventh step, the IWU, via functional interface CM<sub>2</sub>, transmits an InitialDP message to the SCF<sup>S</sup>, after reconstructing this message from the information received in the PromptAndCollectUserInformation message.

- In an eighth step, the SCF<sup>S</sup> issues a command to the SSF<sup>S</sup> to establish a temporary connection with a section of the service provider which provides the speech recognition functionality, said section being denoted by the term Special Resource Function SRF<sup>S</sup>. Said command can be transmitted directly to the SSF<sup>S</sup> by the SCF<sup>S</sup>, or, as illustrated in Fig. 4, can be transmitted by the SCF<sup>S</sup> to the IWU (via functional interface CM<sub>2</sub>) and then forwarded by the IWU (via functional interface
- 35 CM<sub>1</sub>) to the SSF<sup>S</sup>.

- 40 In a ninth step, the SSF<sup>S</sup> establishes a temporary connection with the SRF<sup>S</sup>. At this time a connection has in fact been established between

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the calling subscriber A and the special service "speech recognition" offered by the service provider SP.

In a tenth step, the SRF<sup>S</sup> transmits an instruction request to the SCF<sup>S</sup>. Said SRF<sup>S</sup> can transmit said instruction request directly to the SCF<sup>S</sup>

- 5 or, as illustrated in Fig. 4, by transmitting said instruction request to the IWU (via the SSF<sup>S</sup> and via functional interface CM<sub>1</sub>) after which said instruction request is forwarded by the IWU (via functional interface CM<sub>2</sub>) to said SCF<sup>S</sup>.

- In an eleventh step the SCF<sup>S</sup> transmits a PromptAndCollectUser-  
10 Information message to the SRF<sup>S</sup>. In a similar manner as described for the tenth step, the SCF<sup>S</sup> transmits this message through mediation of the IWU, that is to say via functional interface CM<sub>2</sub>, functional interface CM<sub>1</sub> and the SSF<sup>S</sup>. The SRF<sup>S</sup> is hereby instructed to extract  
15 the call destination number (that is to say the telephone number of the called subscriber B) from the signal received from the calling subscriber A (that is to say: the voice command).

- In a twelfth step, the SRF<sup>S</sup> extracts the call destination number from the signal received from the calling subscriber A, translates this  
20 into a format which can be understood by network N, and transmits this information through mediation of the IWU to the SCF<sup>S</sup>.

In a thirteenth step the SCF<sup>S</sup>, via functional interface CM<sub>2</sub>, transmits a request for connection to the call destination number to the IWU.

- In a fourteenth step, the IWU translates this request into a PromptAndCollectUserInformationResult message which, via functional  
25 interface CM<sub>3</sub>, is transmitted to the SCF<sup>N</sup> of the network N as a reply to the PromptAndCollectUserInformation message which was sent to the IWU by the SCF<sup>N</sup> in the sixth step. The ReceivedInformationArg parameter of the PromptAndCollectUserInformationResult message then contains the digits of the call destination number.

- 30 In a fifteenth step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to drop the connection with the IWU of the service provider.

- In a sixteenth step, the SSF<sup>N</sup> transmits an ISUP REL message to the IWU in order to drop the connection between the SSF<sup>N</sup> and the IWU. The IWU forwards said message to the SSF<sup>S</sup> in order to drop the connection  
35 between the SSF<sup>S</sup> and the IWU.

In a seventeenth step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to establish a connection with the call destination number, in order to establish the connection between A and B.

- 40 It will be clear that the services of the service provider are now no longer required for establishing and maintaining the connection between A and B.

In the example discussed, the temporary connection between the SSF<sup>N</sup> and

the SRF<sup>S</sup> of the service provider was dropped directly after the call destination number became known at the SCF<sup>N</sup>. It is also possible, however, that the SSF<sup>N</sup> received the command from the SCF<sup>N</sup> to monitor the occurrence of other events, in which case the connection can be maintained longer.

From the example described above it will be clear to those skilled in the art that the result of the IWU proposed by the present invention is that the integrity of the network N is guaranteed, since the communication between the IWU and the SCF<sup>N</sup> of the network N can take place only via predetermined messages. It will be explained below, with reference to the diagram of Fig. 6, how a service provider can extend his service program without further consultation with the network operator by a set of predetermined messages being available to the service provider at the SCF<sup>N</sup>. In this second example, the service provider will set an Event Detection Point at the triggering point T\_Disconnect in the SSF<sup>N</sup> (this is DP 17 in IN CS1). It is assumed that there is already a relationship between the SCF<sup>N</sup> and the IWU of the service provider.

In a first step, the SCF<sup>S</sup> of the service provider S transmits a RequestReportBCSMEvent message to the IWU via functional interface CM<sub>2</sub>. In a second step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message, the request for activation of the DP becoming included in the ReceivedInformationArg parameter in encoded form. By means of mutual agreements, the manner of encoding is known beforehand by both the service provider and the network-operator. The request is transmitted to the SCF<sup>N</sup> by the IWU via functional interface CM<sub>3</sub>. It is remarked in this regard that the service provider and the network operator only need to reach agreement concerning the manner of encoding of certain requests, but at the time the service provider places a request, as, in this case, the DP request, negotiation regarding permitting or not permitting said request is not required: in principle, the DP facility is already available for the service provider, and he can switch this facility on or off at his own discretion.

In a third step, the SCF<sup>N</sup> translates the received request into a RequestReportBCSMEvent message again and transmits this message to the SSF<sup>N</sup>.

In a fourth step, the SCF<sup>N</sup> subsequently transmits a new PromptAndCollectUserInformation message to the IWU, in order to signal to the SCF<sup>S</sup>, via the IWU, that the SCF<sup>N</sup> is ready to receive further commands.

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In a fifth step, the SCF<sup>S</sup> transmits a Connect message to the IWU, via functional interface CM<sub>2</sub>, in order to establish a connection with a subscriber B.

5 In a sixth step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message, the telephone number of B becoming included in encoded form in the ReceivedInformationArg parameter. The request is transmitted to the SCF<sup>N</sup> by the IWU via functional interface CM<sub>3</sub>.

10 In a seventh step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to drop the connection with the service provider, but the SCF<sup>S</sup> of the service provider is still active and awaiting further instructions since DPs are still in effect.

15 In an eighth step, the SSF<sup>N</sup> transmits an ISUP\_REL message to the IWU, via functional interface CM<sub>4</sub>, said message being forwarded by the IWU via functional interface CM<sub>1</sub> to the SSF<sup>S</sup>, so that the service provider is disconnected from the network.

In a ninth step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to establish a connection with the subscriber B.

20 When said subscriber B then, at an arbitrary later time, drops the connection, the activated state of DP 17 results in an EventReportBCSMEvent message which the SSF<sup>N</sup>, in a tenth step, transmits to the SCF<sup>N</sup>.

In an eleventh step, the SCF<sup>N</sup> issues a command to the SSF<sup>N</sup> to establish a temporary connection with the service provider.

25 In a twelfth step the SSF<sup>N</sup>, via functional interface CM<sub>4</sub>, establishes a temporary connection with the IWU, after which the IWU, via functional interface CM<sub>1</sub>, transmits a setup message to the SSF<sup>S</sup>.

30 In a thirteenth step the SSF<sup>S</sup> responds by transmitting, via functional interface CM<sub>1</sub>, an InitialDP message to the IWU. In this case only a few of the parameters present in the InitialDP message are relevant, such as the number of the calling subscriber A or another reference.

In a fourteenth step the IWU, via functional interface CM<sub>3</sub>, requests instructions from the SCF<sup>N</sup>.

The SCF<sup>N</sup>, in a fifteenth step, then issues instructions to the IWU.

35 This, for example, can take place by means of the DisplayInformation parameter in a PromptAndCollectUserInformation message. The information in this parameter is an IA5 string, of which the contents conform to previously reached agreements between the network operator and the service provider. In this example the information comprises a

40 combination of ,inter alia, the telephone number of the calling subscriber A, the telephone number of the called subscriber B, and command-related information such as ServiceKey, DetectionPoint, and so

on. It concerns the information which the SCF<sup>N</sup> received from SCF<sup>N</sup> the with the EventReportBCSMEEvent message in the tenth step.

In a sixteenth step the IWU, via functional interface CM<sub>2</sub>, transmits an EventReportBCSMEEvent message to the SCF<sup>S</sup>, after reconstructing said

5 message from the information received in the PromptAndCollectUserInformation message.

Assuming that the DP was only a notification trigger, the SCF<sup>S</sup> wants now to drop the connection, to which end the SCF<sup>S</sup>, in a seventeenth step, transmits a ReleaseCall message to the IWU via functional

10 interface CM<sub>2</sub>.

In an eighteenth step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message, the stop signal being included in encoded form in the ReceivedInformationArg

15 parameter. The request is transmitted by the IWU, via functional interface CM<sub>3</sub>, to the SCF<sup>N</sup>. The encoding form again is agreed upon beforehand by the service provider and the network operator, as previously discussed.

In a nineteenth step, the SCF<sup>N</sup> translates this instruction and transmits a DisconnectForwardConnection message and/or a ReleaseCall

20 message to the SSF<sup>N</sup>.

In a twentieth step, the connection of the SSF<sup>N</sup> with the IWU and the SSF<sup>S</sup> is dropped.

It will be clear to those skilled in the art that the scope of the present invention is not limited to the examples discussed above, but that various changes and modifications thereof are possible without deviating from the scope of the invention as defined in the appended Claims. In this regard, for example, it has been assumed in the discussion of the examples that the service provider has an

30 Intelligent Network (standardised IN structure). Within the scope of the present invention, however, it is also possible that the service provider has an IN-like structure, for example a network in which the communication protocols deviate from the international standard.

Further, it is for example possible that the third and fourth

35 functional interfaces are integrated into a common functional interface.

## CLAIMS

1. An infrastructure for data transmission, comprising:  
a network (N) with connection points (11, 12) for subscribers (A, B);  
5 a service provider (SP) coupled to the network (N);  
in which the network (N) comprises a service switching function (SSF<sup>N</sup>)  
as well as a service control function (SCF<sup>N</sup>) for controlling the  
service switching function (SSF<sup>N</sup>);  
in which the service provider (SP) comprises a service switching  
10 function (SSF<sup>S</sup>) as well as a service control function (SCF<sup>S</sup>) for  
controlling the service switching function (SSF<sup>S</sup>);  
in which the service control function (SCF<sup>N</sup>) of the network (N) has at  
its disposal a set of generic instructions which are available to the  
service control function (SCF<sup>S</sup>) of the service provider (SP);  
15 in which the service provider (SP) comprises an inter-working unit  
(IWU), said inter-working unit (IWU):  
- being connected, via a first functional interface (CM<sub>1</sub>), to a  
service switching function (SSF<sup>S</sup>) of the service provider (SP), said  
first functional interface (CM<sub>1</sub>) being such that the inter-working unit  
20 (IWU), in the communication with the service switching function (SSF<sup>S</sup>)  
of the service provider (SP), behaves as service control function  
(SCF<sup>S</sup>);  
- being connected, via a second functional interface (CM<sub>2</sub>), to a  
service control function (SCF<sup>S</sup>) of the service provider (SP), said  
25 second functional interface (CM<sub>2</sub>) being such that the inter-working  
unit (IWU), in the communication with the service control function  
(SCF<sup>S</sup>) of the service provider (SP), behaves as service switching  
function;  
- being connected, via a third functional interface (CM<sub>3</sub>), to a  
30 service control function (SCF<sup>N</sup>) of the network, and being connected,  
via a fourth functional interface (CM<sub>4</sub>), to a service switching  
function (SSF<sup>N</sup>) of the network, said third and fourth functional  
interfaces (CM<sub>3</sub>, CM<sub>4</sub>) being such that the inter-working unit (IWU), in  
the communication with the service control function (SCF<sup>N</sup>) and the  
35 service switching function (SSF<sup>N</sup>), behaves as special resource function  
(SRF).
2. An infrastructure according to Claim 1, in which the service  
switching function (SSF<sup>S</sup>) of the service provider (SP) is arranged to  
40 transmit messages; destined for the service control function (SCF<sup>S</sup>) of  
the service provider (SP), via the first functional interface (CM<sub>1</sub>) to  
the inter-working unit (IWU), in which the inter-working unit (IWU) is

arranged to forward said received messages, possibly after a suitable conversion, via the second functional interface (CM<sub>2</sub>) to the service control function (SCF<sup>S</sup>).

5     3.     An infrastructure according to Claim 1 or 2, in which the service control function (SCF<sup>S</sup>) of the service provider (SP) is arranged to transmit commands, destined for the service switching function (SSF<sup>S</sup>) of the service provider (SP), via the second functional interface (CM<sub>2</sub>) to the inter-working unit (IWU), in which the inter-  
10   working unit (IWU) is arranged to forward said received commands, possibly after a suitable conversion, via the first functional interface (CM<sub>1</sub>) to the service switching function (SSF<sup>S</sup>).

15     4.     An infrastructure according to any of the preceding Claims, in which the service control function (SCF<sup>S</sup>) of the service provider (SP) is arranged to transmit commands, destined for the service switching function (SSF<sup>N</sup>) of the network (N), via the second functional interface (CM<sub>2</sub>), to the inter-working unit (IWU), in which the inter-working unit (IWU) is arranged to forward said received commands, possibly after a  
20   suitable conversion, via the third functional interface (CM<sub>3</sub>) to the service control function (SCF<sup>N</sup>) of the network (N), and in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to translate the received information to a suitable command for the service switching function (SSF<sup>N</sup>) of the network (N) and to transmit  
25   said command to the service switching function (SSF<sup>N</sup>) of the network.

30     5.     An infrastructure according to any of the preceding Claims, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to issue a command, upon reception of a certain triggering signal from a calling subscriber (A), to the service switching function (SSF<sup>N</sup>) of the network (N) to establish a temporary connection with the inter-working unit (IWU) of the service provider (SP) via the fourth functional interface (CM<sub>4</sub>); and in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to transmit an  
35   instruction, after establishing said temporary connection and after the reception of a response from the service control function (SCF<sup>S</sup>) of the service provider (SP), to the service control function (SCF<sup>S</sup>) of the service provider (SP).

40     6.     An infrastructure according to Claim 5, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to interpret a reply, transmitted by the service control function (SCF<sup>S</sup>) of the

service provider (SP) in response to said instruction either as the telephone number of a called subscriber, as a request for activating one or more DetectionPoints, or as a stop signal.

5     7.     An infrastructure according to Claim 6, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if the said reply of the service control function (SCF<sup>S</sup>) of the service provider (SP) is interpreted as a stop signal, issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to drop the connection  
10     with the inter-working unit (IWU) of the service provider (SP) and to drop the connection with the calling subscriber (A).

8.     An infrastructure according to Claim 6 or 7, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if  
15     the said reply of the service control function (SCF<sup>S</sup>) of the service provider (SP) is interpreted as the telephone number of a called subscriber (B) issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to drop the connection with the inter-working unit (IWU) of the service provider (SP) and to establish a connection with  
20     the called subscriber (B).

9.     An infrastructure according to any of the Claims 6-8, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if the said reply of the service control function (SCF<sup>S</sup>) of the service  
25     provider (SP) is interpreted as a request for activating one or more DetectionPoints, issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to switch on the related DetectionPoints and transmit a further instruction to the service control function (SCF<sup>S</sup>) of the service provider (SP).



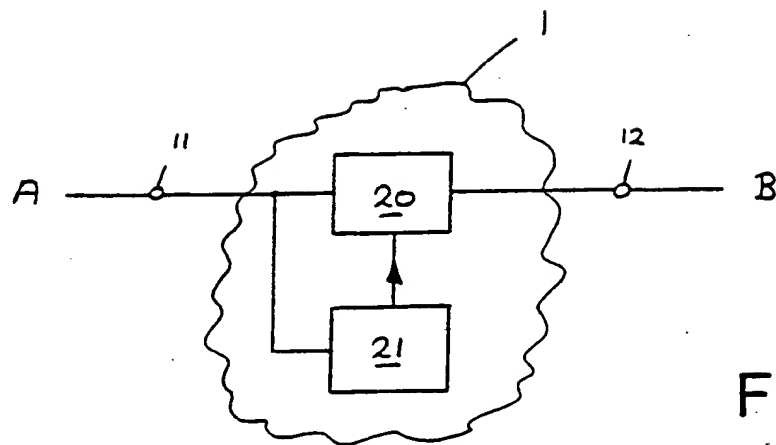


FIG. 1

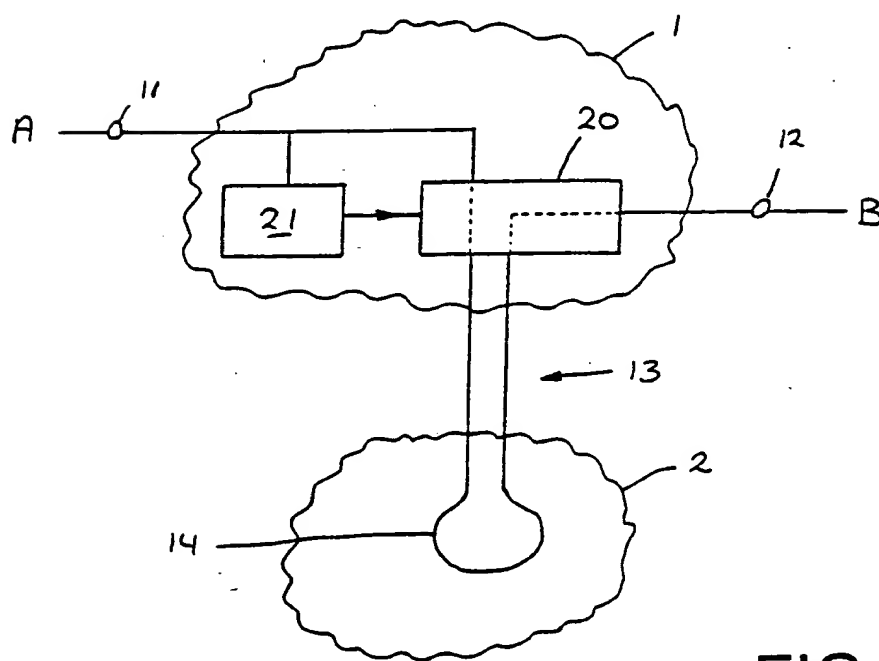


FIG. 2

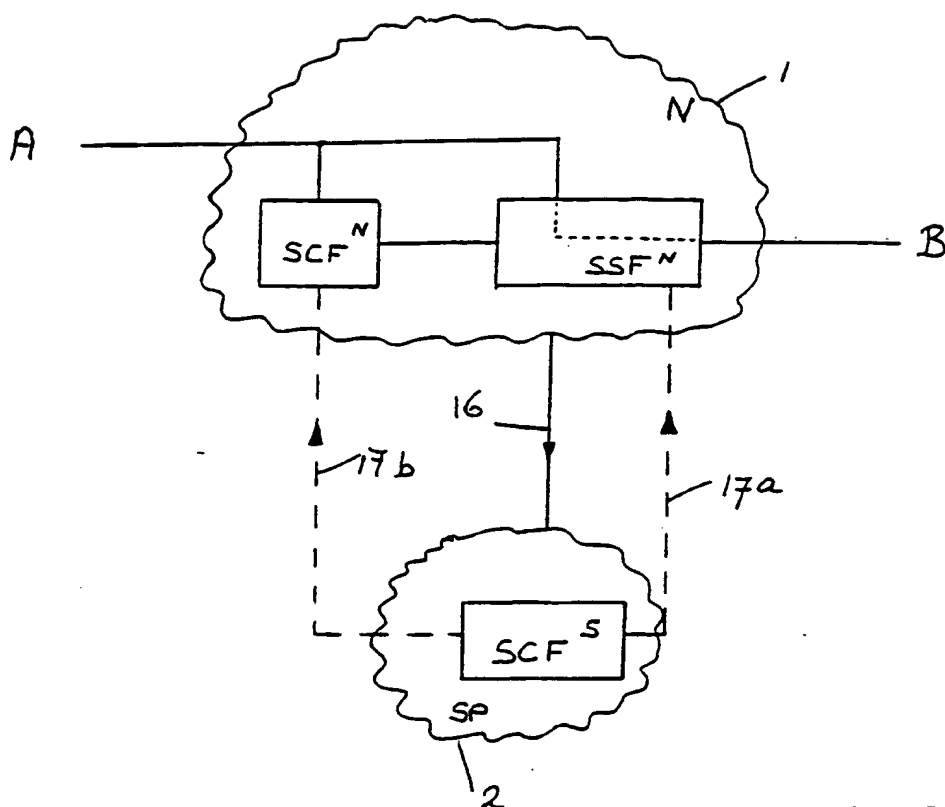


FIG. 3

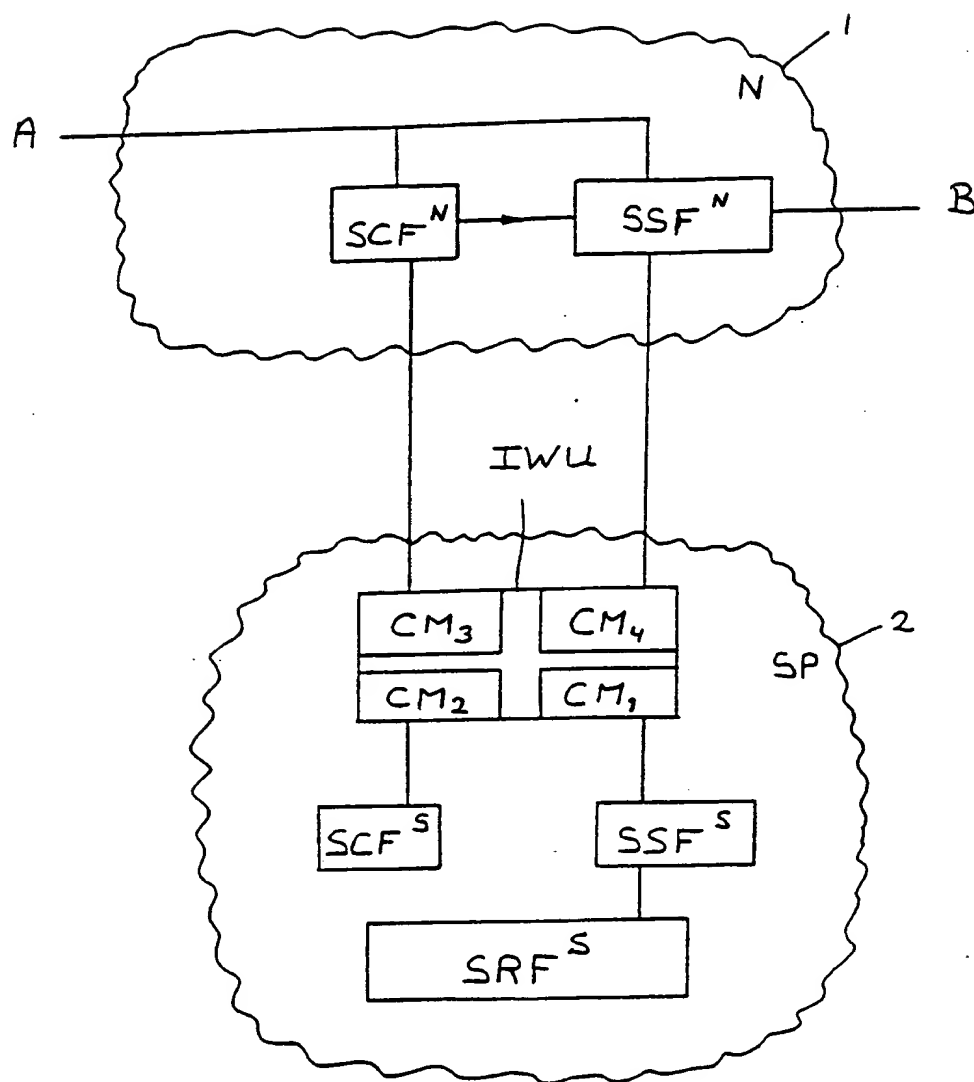


FIG. 4

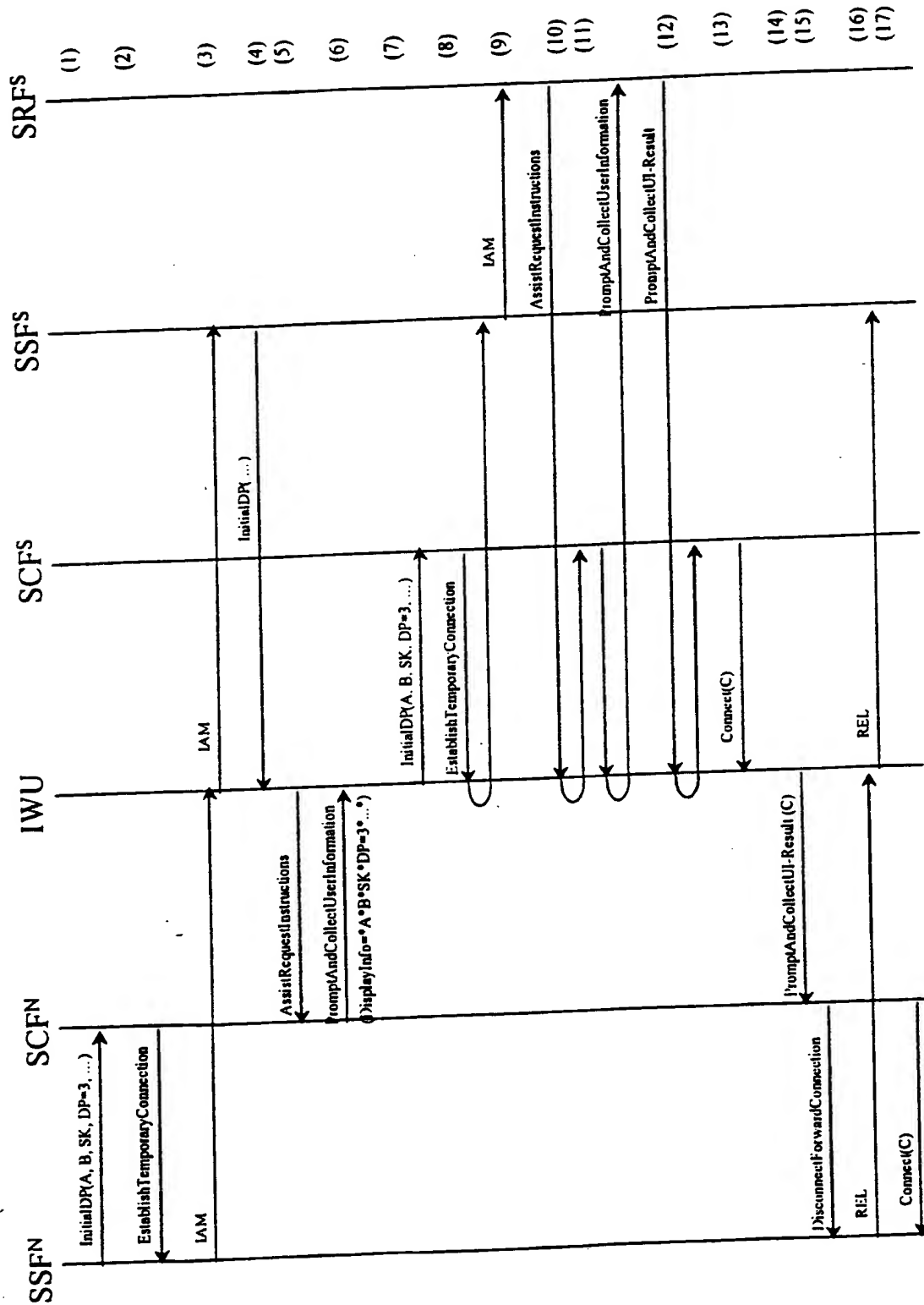


FIG. 5

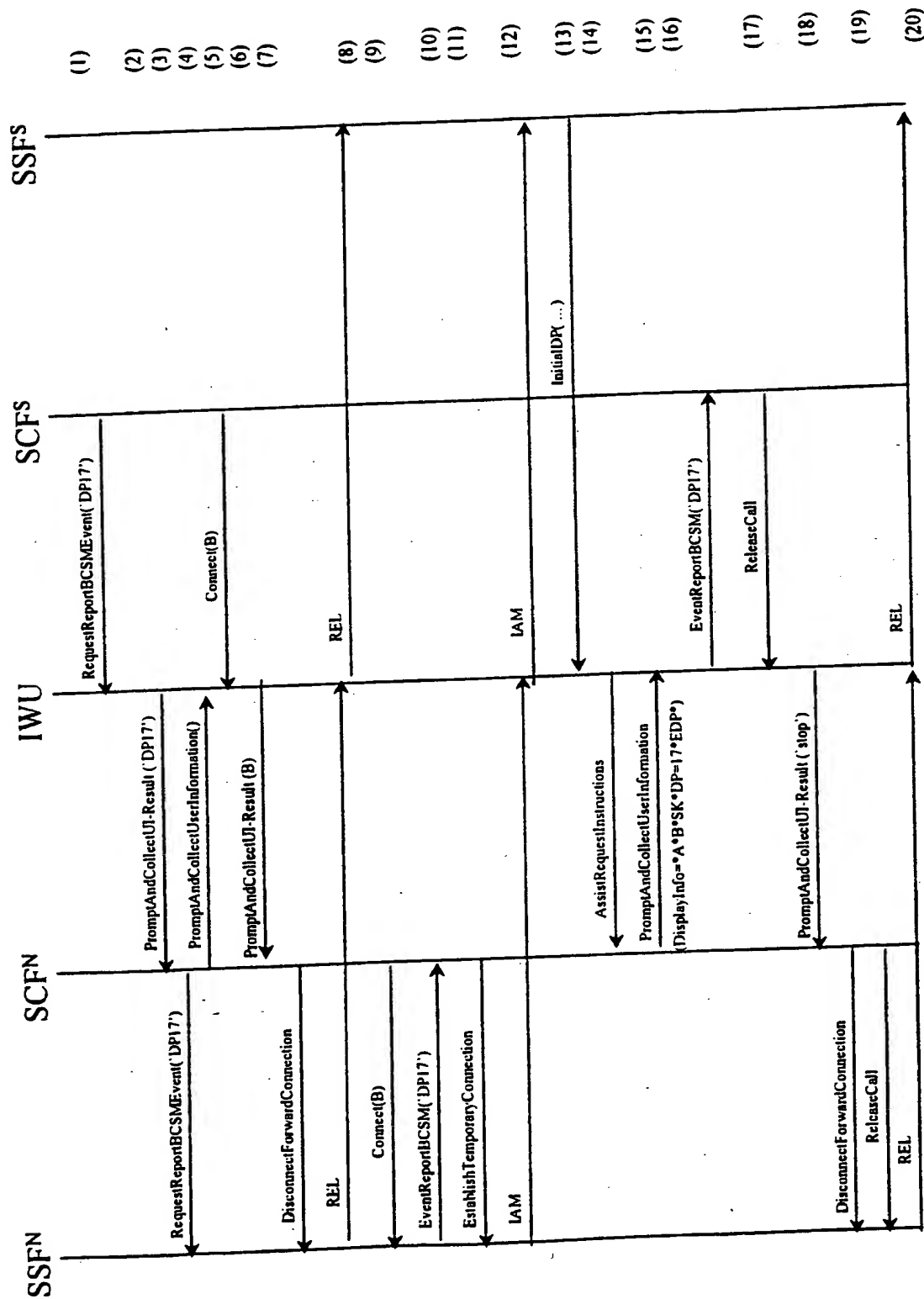


FIG. 6

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07771

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 701 301 A (WEISSER JR FRANK J) 23 December 1997 (1997-12-23) column 8, line 19 -column 11, line 34 claims 1-46	1-9
A	US 5 430 719 A (WEISSER JR FRANK J) 4 July 1995 (1995-07-04) page 9, line 49 -page 14, line 22	1-9
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-/-		



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

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- "&" document member of the same patent family

Date of the actual completion of the international search

18 April 2000

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# INTERNATIONAL SEARCH REPORT

Int .tional Application No

PCT/EP 99/07771

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>CHEN J C: "OPEN AIN OPERATIONS STRATEGIES"            PROCEEDINGS OF THE NETWORK OPERATIONS AND MANAGEMENT SYMPOSIUM (NOM, KISSIMMEE, FEB. 14 - 17, 1994, vol. 1, no. SYMP. 4, 14 February 1994 (1994-02-14), pages 140-152, XP000452403.            INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS            the whole document</p>	

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Information on patent family members

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

Int. Application No  
**PCT/EP 99/07771**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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CORRECTED VERSION

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 June 2000 (02.06.2000)

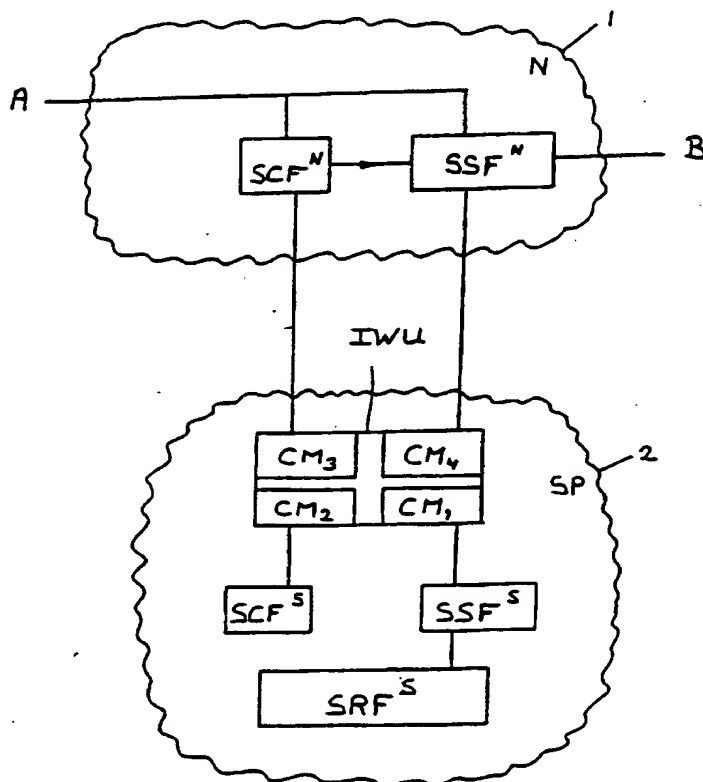
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- (74) Agent: KLEIN, Bart; Koninklijke KPN N.V., P.O. Box 95321, NL-2509 CH The Hague (NL).
- (81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW.

[Continued on next page]

(54) Title: MEDIATION OF TRAFFIC IN AN INTELLIGENT NETWORK



(57) Abstract: An infrastructure for telephony is described, comprising a network (n) and a service provider (SP) coupled thereto. The network comprises a service switching function (SSF<sup>N</sup>) as well as a service control function (SCF<sup>N</sup>) for controlling said service switching function. The service provider comprises a service switching function (SSF<sup>S</sup>) as well as a service control function (SCF<sup>S</sup>) for controlling said service switching means. The service provider comprises an inter-working unit (IWU). In communication with a service switching function (SSF<sup>S</sup>) of the service provider, the inter-working unit (IWU) behaves as service control function. In communication with a service control function (SCF<sup>S</sup>) of the service provider, the inter-working unit (IWU) behaves as service switching function. In communication with the network, the inter-working unit (IWU) behaves as special resource point (SRP).

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## MEDIATION OF TRAFFIC IN AN INTELLIGENT NETWORK

In general, the present invention is related to an infrastructure for data transmission, in particular an infrastructure for communication. More in particular, the present invention is related to an infrastructure for telephony, for which reason the present invention will be explained below specifically for this exemplary embodiment with reference to the drawing, in which equal reference signs denote equal or similar parts, and in which:

Figs. 1 to 3 inclusive schematically illustrate communication infrastructures according to the prior art; Fig. 4 schematically illustrates a communication infrastructure according to the present invention;

Figs. 5 and 6 are flowcharts which illustrate a sequence of communication in the communication infrastructure according to the present invention.

In the discussion below use will be made of concepts and abbreviations which are customary in this field; for a better understanding of these concepts and abbreviations, reference is made to the following publicly available publications:

1) Terms and Definitions, Abbreviations and Acronyms - Recommendations on Means of Expression (Series B), Blue Book Volume I, Fascicle I.3, ITU-T, Geneva, 1988.

2) Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol Specification, ETSI, ETS 300 374-1, September 1994.

3) Intelligent Network (IN); Interface Recommendation for Intelligent Network CS-1, ITU-T, Recommendation Q.1218, October 1995.

4) Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol Specification, ETSI, draft EN 301 140-1 V1.1.1,

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ISA/EP

March 1998.

5) Intelligent Network (IN); Interface Recommendation for Intelligent Network CS-2, ITU-T, Draft Recommendation Q.1228, April 1997.

5 Fig. 1 is a functional block diagram which schematically illustrates a conventional network 1 for telephony. Such a network, which is known in the prior art, has many connection points at which users or subscribers can be connected. At a first connection 11, a first subscriber A  
10 is connected to the network, and at a second connection 12 a second subscriber B is connected to the network. At the request of the first or calling subscriber A, a connection is established between said first subscriber A and the second or called subscriber B if certain conditions have  
15 been satisfied. Said network 1 thereto comprises switching means 20 for establishing a connection between a calling subscriber and a called subscriber, as well as control means 21 for controlling said switching means 20. The first connection 11 is connected to an input of the switching  
20 means 20 and to an input of the control means 21. The first subscriber A transmits a request to said control means 21 (for example by entering the desired subscriber number), and the control means 21 examine the validity of the request and, upon proven validity, instruct the switching  
25 means 20 to establish a connection between A and B. The infrastructure illustrated in Fig. 1 is the classical infrastructure, which consists exclusively of the said network, and in which the facilities offered to the users are dependent only upon decisions of the network operator.  
30 A more recent development of an infrastructure is illustrated in Fig. 2. In this case, at a connection 13, a service platform 2, of which the owner is in general denoted by the term "service provider", is connected to said network 1 in a manner which is similar to the manner

in which a subscriber is connected to said network 1. The service provider, who usually not the same as the network operator, offers extra services to the subscribers of said network 1 by means of said service platform 2.

- 5 Such an extra service, for example, is speech recognition. The present invention shall be explained more specifically below for this exemplary embodiment, but it shall be clear that the present invention is equally applicable for other services.

10

The calling subscriber A is first connected to the service platform 2, so that the calling subscriber A can supply his spoken command, of the type "connect me to B", to said service platform 2. Said service platform 2 can interpret  
15 the received command, and reconnects the calling subscriber A to said network 1, transmitting an accompanying understandable command for said network 1 (a translation, as it were, of the spoken command of said calling subscriber A) to establish the desired connection with the  
20 called subscriber B.

- A disadvantage of the implementation illustrated in Fig. 2 is that the actual connection between the two subscribers A and B runs via said service platform, as indicated by the loop 14. This means that, during the full length of the  
25 call, not only a connection between the calling subscriber A and said network 1, as well as a connection between said network 1 and the called subscriber B, is engaged, but that two connections (forward and back, mutually connected via said loop 14) between said network 1 and said service  
30 platform 2 are also engaged. This makes this infrastructure relatively expensive, and entails a substantial impairment of the service provider's capacity. After all, as long as the established connection continues to exist, the service provider is unable to use the two connections between

network 1 and the service platform 2, as well as the components involved in the loop connection 14 within said service platform 2, for other purposes, while on the other hand the aid of the service provider is actually only  
5 required for establishing the connection and not for maintaining the connection.

There are also systems in the prior art in which the connection between the two subscribers A and B runs via said network 1 only, and not via said service platform 2.

10 Two such existing structures will be explained below with reference to Fig. 3.

For the sake of convenience, the term "service provider (SP)" will also be used below instead of the term "service platform". Further, a component which is present in the  
15 network will be denoted by a name or abbreviation with the addition of the exponent N; a service provider component which is present will be denoted in a similar manner by an exponent S.

Fig. 3, like Fig. 4, is a functional diagram illustrating  
20 the sequence of and the transition to various functions of the network N and the service provider SP. The network 1 has a service switching function  $SSF^N$  and a service control function  $SCF^N$  for controlling the service switching function  $SSF^N$ . Said service provider 2 has at least one  
25  $SCF^S$ .

In the existing structure as illustrated in Fig. 3, the voice command of the calling subscriber A is transferred to the service provider SP in a similar manner as described above with respect to Fig. 2. Within the service provider  
30 SP, the voice commands of the calling subscriber A are received, interpreted and assessed. On the basis of said commands the service provider SP subsequently issues a command to certain parts within the network 1, whereby the connection between the two subscribers A and B is directly



established. Thereafter, a connection between the network 1 and the service provider SP for maintaining the voice connection between the two subscribers A and B is no longer required, so that the capacities of the service provider SP can be used for building up a following call and/or supplying a subsequent service.

A first variant of this prior art system is implemented in such a manner that an SCF<sup>S</sup> can issue a control command to an SSF<sup>N</sup> (17a) directly. This has the substantial disadvantage of the network operator losing control, at any rate in part, over his network, so that he can no longer guarantee the integrity of his network.

A second variant of the above-mentioned system is implemented in such a manner that an SCF<sup>S</sup> transmits an instruction to an SCF<sup>N</sup> (17b), which subsequently controls the switching function SSF<sup>N</sup>. With respect to the first-mentioned variant this system admittedly has the advantage that the integrity of said network 1 is better guaranteed, since the switching function SSF<sup>N</sup> is controlled only on the basis of commands which are generated within the network, namely by the SCF<sup>N</sup>, and in principle the network operator himself can determine whether "unwarranted" control commands are issued to the SSF<sup>N</sup>. A disadvantage, however, is that at the SCF<sup>N</sup> information must be present regarding the privileges of the SCF<sup>S</sup>, and that the SCF<sup>N</sup> must fulfil a policing function to check commands originating from the SCF<sup>S</sup>. It is further a disadvantage that this structure is rigid in the sense that if the service provider, for example, wishes to introduce a new service, this is only possible after consultation and agreement between the service provider and the network operator, since the introduction of a new service must be accompanied by new information being present at the SCF<sup>N</sup>.

The present invention seeks to eliminate the above-mentioned disadvantages or at least alleviate them. More in particular, the present invention seeks to provide an infrastructure for communication comprising a network with subscriber connections and a service provider connected to the network, in which on the one hand the integrity of the network is guaranteed but, on the other hand, the service provider has the possibility of adding or changing services without having to consult with the network operator.

According to an important aspect of the present invention a generic set of instructions is present at the SCF<sup>N</sup>, and the service provider SP is set up to function as a Special Resource Point SRP.

Fig. 4 diagrammatically shows a functional block diagram of the infrastructure according to the present invention. The service provider SP comprises an inter-working unit IWU, coupling the service provider SP and the network N. More in particular, the IWU within the domain of the service provider is coupled to an SSF<sup>S</sup> and an SCF<sup>S</sup>, while the IWU is externally coupled to an SSF<sup>N</sup> and an SCF<sup>N</sup> of the network.

More in particular, the IWU comprises:  
a first functional interface CM<sub>1</sub> between the IWU and an SSF<sup>S</sup>; a second functional interface CM<sub>2</sub> between the IWU and an SCF<sup>S</sup>; a third functional interface CM<sub>3</sub> between the IWU and an SCF<sup>N</sup>; a fourth functional interface CM<sub>4</sub> between the IWU and an SSF<sup>N</sup>.

With respect to the term "functional interface" it is remarked that this refers to the interaction between different functions. For example, it may refer to a communication protocol.

It is further remarked that the communication within the network N as well as the communication from and to the network N takes place via protocols which are associated with an Intelligent Network as defined in the publications referred to in the introduction. The manner in which the various parts within the domain of the service provider SP communicate with each other, however, is unrestricted. The service provider SP can choose to set up his own domain as an Intelligent Network, and to use the related standardised protocols, but said service provider SP can also choose to use another structure and/or other protocols. As shall become clear from the description below, the choice of the service provider SP in this regard has no influence on the functioning of the present invention. Although the terminology SCF, SSF, SRF etc. in the publications referred to in the introduction is defined in conjunction with an Intelligent Network and the related standardised protocols, the terminology SCF<sup>s</sup>, SSF<sup>s</sup>, SRF<sup>s</sup> etc. will be used below to refer both to the functions defined in the said publications and to functions similar thereto, and the interfacing between said functions shall not be limited to the protocols defined in said publications.

The first functional interface CM<sub>1</sub> is such that, in the communication with the SSF<sup>s</sup>, the IWU behaves as an SCF. Seen from the SSF<sup>s</sup>, the IWU thus has, as it were, an SCF face.

The second functional interface CM<sub>2</sub> is such that, in the communication with the SCF<sup>s</sup>, the IWU behaves as an SSF; seen from the SCF<sup>s</sup> the IWU thus has, as it were, an SSF face.

It is remarked that, in the example described here, the SSF<sup>s</sup> has a transfer function for the exchange of messages between the SCF<sup>s</sup> and the SRF<sup>s</sup>. The present invention,

however, is not restricted to such an implementation: for the exchange of messages between the SCF<sup>S</sup> and the SRF<sup>S</sup> other implementations are also possible which, however, will not be explicitly described here.

- 5 The third and fourth functional interfaces CM<sub>3</sub> and CM<sub>4</sub> of the IWU are such that, in the communication with the network N, the IWU behaves as an SRP; seen from the network the IWU of the service provider thus has, as it were, an SRP face. Since special resource points SRP are known per  
10 se, the functioning thereof will not be further explained here.

A first advantage of the infrastructure proposed by the present invention is that the functions SCF<sup>S</sup> and SSF<sup>S</sup> of the service provider SP are not required to be standard  
15 functions, and that the communication between these functions and the IWU may run via an arbitrary protocol which can be defined by the service provider himself; in this regard it is only important that the functions within the service provider "understand each other". As far as the  
20 communication between the network N and the service provider is concerned, the IWU functions as an interpreter, in such a manner that the communication between the IWU and the other parts of the service provider takes place via the said arbitrary protocol, while the communication between  
25 the IWU and the network is carried out on the basis of pre-established standard protocols. In this regard it is remarked that, after suitable processing, the IWU in fact forwards each arriving message, and that no memory is required in the IWU to store the status of calls. This  
30 implies that the IWU can be a relatively cheap unit. In the SCF<sup>N</sup>, a generic service logic functions which is independent of the service(s) provided by the service provider SP, which forms part of the agreements between the network operator and the service provider, and which is

controlled by the network operator. The IWU and thereby the SCF<sup>S</sup>, can only use pre-determined generic instructions which form part of said generic service logic; the generic instructions from said generic service logic which are  
5 available to the IWU are also controlled by the network operator. For this reason it is not possible, whether on purpose or not, to issue erroneous or undesired instructions from the service provider to the network, so that the integrity of the network is guaranteed.  
10 Although the said generic instructions are pre-determined by the network operator and are made available to the service provider, the service provider is not obliged to actually use all said instructions. The set of generic instructions is available to the service provider and the  
15 service provider can make a selection from it when establishing a service package. Therefore, by simply using more instructions from the set of generic instructions, the service provider can change his service package in a simple manner without the necessity of consulting with the network  
20 operator.

By way of example, the messages exchanged between the various parts of the network and of the service provider will now be explained with reference to the diagram of Fig.  
25 5. This example is related to the service "dialling by means of voice control".

In a first step, the SSF<sup>N</sup> detects the occurrence of a triggering event, for example the reception of an initiating signal from the calling subscriber A. The SSF<sup>N</sup>  
30 then transmits an InitialDP message (IDP(A,B,SK,DP=3,...)) to the SCF<sup>N</sup>.

In a second step, the SCF<sup>N</sup> issues a command (ETC) to the SSF<sup>N</sup> to establish a temporary connection with the IWU (via the functional interface CM, thereof), as if it were an

SRF.

In a third step, the SSF<sup>N</sup> establishes (IAM) a temporary connection with the IWU via functional interface CM<sub>4</sub>, after which the IWU transmits a setup message (IAM) to the SSF<sup>S</sup> via functional interface CM<sub>1</sub>.

In a fourth step, the SSF<sup>S</sup> responds by transmitting an InitialDP message (IDP) to the IWU via functional interface CM<sub>1</sub>. In this case the parameters present in the InitialDP message are not significant, since said message serves only for stopping the call setup process in the SSF<sup>S</sup> in order to make the SSF<sup>S</sup> wait for instructions from the SCF<sup>S</sup>.

In a fifth step the IWU, via functional interface CM<sub>3</sub>, requests instructions (ARI) from the SCF<sup>N</sup>.

The SCF<sup>N</sup> then, in a sixth step, issues instructions to the IWU. This may take place, for example, by means of the DisplayInformation (DI) parameter (\*A\*B\*SK\*DP=3\*...\*) in a PromptAndCollectUserInformation message (PACUI). The information in said parameter is an IA5 string, of which the contents conform to previously reached agreements between the network operator and the service provider. In this example the information comprises a combination of ,inter alia, the telephone number of the calling subscriber A, the telephone number of the called subscriber B, and command-related information such as ServiceKey, DetectionPoint, and so on. It concerns the information which the SCF<sup>N</sup> received from the SSF<sup>N</sup> with the InitialDP message in the first step.

In a seventh step, the IWU, via functional interface CM<sub>2</sub>, transmits an InitialDP message (IDP) to the SCF<sup>S</sup>, after reconstructing this message from the information received in the PromptAndCollectUserInformation message (PACUI).

In an eighth step, the SCF<sup>S</sup> issues a command (ETC) to the SSF<sup>S</sup> to establish a temporary connection with a section of the service provider which provides the speech recognition

functionality, said section being denoted by the term Special Resource Function SRF<sup>s</sup>. Said command can be transmitted directly to the SSF<sup>s</sup> by the SCF<sup>s</sup>, or, as illustrated in Fig. 4, can be transmitted by the SCF<sup>s</sup> to the IWU (via functional interface CM<sub>2</sub>) and then forwarded by the IWU (via functional interface CM<sub>1</sub>) to the SSF<sup>s</sup>. In a ninth step, the SSF<sup>s</sup> establishes (IAM) a temporary connection with the SRF<sup>s</sup>. At this time a connection has in fact been established between the calling subscriber A and the special service "speech recognition" offered by the service provider SP.

In a tenth step, the SRF<sup>s</sup> transmits an instruction request (ARI) to the SCF<sup>s</sup>. Said SRF<sup>s</sup> can transmit said instruction request directly to the SCF<sup>s</sup> or, as illustrated in Fig. 4, by transmitting said instruction request to the IWU (via the SSF<sup>s</sup> and via functional interface CM<sub>1</sub>) after which said instruction request is forwarded by the IWU (via functional interface CM<sub>2</sub>) to said SCF<sup>s</sup>.

In an eleventh step the SCF<sup>s</sup> transmits a PromptAndCollectUserInfo message (PACUI) to the SRF<sup>s</sup>. In a similar manner as described for the tenth step, the SCF<sup>s</sup> transmits this message through mediation of the IWU, that is to say via functional interface CM<sub>2</sub>, functional interface CM<sub>1</sub> and the SSF<sup>s</sup>. The SRF<sup>s</sup> is hereby instructed to extract the call destination number (that is to say the telephone number of the called subscriber B) from the signal received from the calling subscriber A (that is to say: the voice command).

In a twelfth step, the SRF<sup>s</sup> extracts the call destination number from the signal received from the calling subscriber A, translates this into a format which can be understood by network N, and transmits (PACUI-R) this information through mediation of the IWU to the SCF<sup>s</sup>.

In a thirteenth step the SCF<sup>s</sup>, via functional interface

CM<sub>2</sub>, transmits a request for connection (C(C)) to the call destination number to the IWU.

In a fourteenth step, the IWU translates this request into a PromptAndCollectUserInformationResult message (PACUI-

5 R(C)) which, via functional interface CM<sub>3</sub>, is transmitted to the SCF<sup>N</sup> of the network N as a reply to the PromptAndCollectUserInformation message (PACUI) which was sent to the IWU by the SCF<sup>N</sup> in the sixth step. The ReceivedInformationArg parameter of the

10 PromptAndCollectUserInformationResult message (PACUI-R(C)) then contains the digits of the call destination number. In a fifteenth step, the SCF<sup>N</sup> issues a command (DFC) to the SSF<sup>N</sup> to drop the connection with the IWU of the service provider.

15 In a sixteenth step, the SSF<sup>N</sup> transmits an ISUP REL message (REL) to the IWU in order to drop the connection between the SSF<sup>N</sup> and the IWU. The IWU forwards (REL) said message to the SSF<sup>S</sup> in order to drop the connection between the SSF<sup>S</sup> and the IWU.

20 In a seventeenth step, the SCF<sup>N</sup> issues a command (C(C)) to the SSF<sup>N</sup> to establish a connection with the call destination number, in order to establish the connection between A and B.

It will be clear that the services of the service provider  
25 are now no longer required for establishing and maintaining the connection between A and B.

In the example discussed, the temporary connection between the SSF<sup>N</sup> and the SRF<sup>S</sup> of the service provider was dropped directly after the call destination number became known at  
30 the SCF<sup>N</sup>. It is also possible, however, that the SSF<sup>N</sup> received the command from the SCF<sup>N</sup> to monitor the occurrence of other events, in which case the connection can be maintained longer.



From the example described above it will be clear to those skilled in the art that the result of the IWU proposed by the present invention is that the integrity of the network N is guaranteed, since the communication between the IWU and the SCF<sup>N</sup> of the network N can take place only via predetermined messages. It will be explained below, with reference to the diagram of Fig. 6, how a service provider can extend his service program without further consultation with the network operator by a set of predetermined messages being available to the service provider at the SCF<sup>N</sup>. In this second example, the service provider will set an Event Detection Point at the triggering point T\_Disconnect in the SSF<sup>N</sup> (this is DP 17 in IN CS1). It is assumed that there is already a relationship between the SCF<sup>N</sup> and the IWU of the service provider.

In a first step, the SCF<sup>S</sup> of the service provider S transmits a RequestReportBCSMEEvent message (RRBCSME) to the IWU via functional interface CM<sub>2</sub>.

In a second step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message (PACUI-R), the request for activation of the DP becoming included in the ReceivedInformationArg parameter ('DP17') in encoded form. By means of mutual agreements, the manner of encoding is known beforehand by both the service provider and the network-operator. The request is transmitted to the SCF<sup>N</sup> by the IWU via functional interface CM<sub>3</sub>. It is remarked in this regard that the service provider and the network operator only need to reach agreement concerning the manner of encoding of certain requests, but at the time the service provider places a request, as, in this case, the DP request, negotiation regarding permitting or not permitting said request is not required: in principle, the DP facility is already available for the service provider, and he can switch this

facility on or off at his own discretion.

In a third step, the SCF<sup>N</sup> translates the received request into a RequestReportBCSMEvent message (RRBCSME) again and transmits this message to the SSF<sup>N</sup>.

- 5 In a fourth step, the SCF<sup>N</sup> subsequently transmits a new PromptAndCollectUserInformation message (PACUI()) to the IWU, in order to signal to the SCF<sup>S</sup>, via the IWU, that the SCF<sup>N</sup> is ready to receive further commands.

- 10 In a fifth step, the SCF<sup>S</sup> transmits a Connect message (C(B)) to the IWU, via functional interface CM<sub>2</sub>, in order to establish a connection with a subscriber B.

- In a sixth step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message (PACUI-R(B)), the telephone number of B becoming included  
15 in encoded form in the ReceivedInformationArg parameter. The request is transmitted to the SCF<sup>N</sup> by the IWU via functional interface CM<sub>3</sub>.

- In a seventh step, the SCF<sup>N</sup> issues a command (DFC) to the SSF<sup>N</sup> to drop the connection with the service provider, but  
20 the SCF<sup>S</sup> of the service provider is still active and awaiting further instructions since DPs are still in effect.

- In an eighth step, the SSF<sup>N</sup> transmits an ISUP\_REL message (REL) to the IWU, via functional interface CM<sub>4</sub>, said  
25 message being forwarded by the IWU via functional interface CM<sub>1</sub> to the SSF<sup>S</sup>, so that the service provider is disconnected from the network.

- In a ninth step, the SCF<sup>N</sup> issues a command (C(B)) to the SSF<sup>N</sup> to establish a connection with the subscriber B.

- 30 When said subscriber B then, at an arbitrary later time, drops the connection, the activated state of DP 17 results in an EventReportBCSMEvent message (ERBCSM) which the SSF<sup>N</sup>, in a tenth step, transmits to the SCF<sup>N</sup>.

- In an eleventh step, the SCF<sup>N</sup> issues a command (ETC) to the

SSF<sup>N</sup> to establish a temporary connection with the service provider.

In a twelfth step the SSF<sup>N</sup>, via functional interface CM<sub>4</sub>, establishes (IAM) a temporary connection with the IWU,

5 after which the IWU, via functional interface CM<sub>1</sub>, transmits a setup message (IAM) to the SSF<sup>S</sup>.

In a thirteenth step the SSF<sup>S</sup> responds by transmitting, via functional interface CM<sub>1</sub>, an InitialDP message (IDP(...)) to the IWU. In this case only a few of the parameters

10 present in the InitialDP message are relevant, such as the number of the calling subscriber A or another reference.

In a fourteenth step the IWU, via functional interface CM<sub>3</sub>, requests instructions (ARI) from the SCF<sup>N</sup>.

The SCF<sup>N</sup>, in a fifteenth step, then issues instructions to  
15 the IWU. This, for example, can take place by means of the DisplayInformation parameter (DI=\*A\*B\*SK\*DP=17\*EDP\*) in a PromptAndCollectUserInformation message (PACUI). The information in this parameter is an IA5 string, of which the contents conform to previously reached agreements

20 between the network operator and the service provider. In this example the information comprises a combination of, inter alia, the telephone number of the calling subscriber A, the telephone number of the called subscriber B, and command-related information such as ServiceKey,

25 DetectionPoint, and so on. It concerns the information which the SCF<sup>N</sup> received from SCF<sup>N</sup> the with the

EventReportBCSMEvent message (ERBCSM) in the tenth step.

In a sixteenth step the IWU, via functional interface CM<sub>2</sub>, transmits an EventReportBCSMEvent message (ERBCSM) to the

30 SCF<sup>S</sup>, after reconstructing said message from the information received in the PromptAndCollectUserInformation message (PACUI).

Assuming that the DP was only a notification trigger, the SCF<sup>S</sup> wants now to drop the connection, to which end the

SCF<sup>S</sup>, in a seventeenth step, transmits a ReleaseCall message (RC) to the IWU via functional interface CM<sub>2</sub>. In an eighteenth step, the received message is translated by the IWU into a PromptAndCollectUserInformationResult message (PACUI-R('stop')), the stop signal being included in encoded form in the ReceivedInformationArg parameter. The request is transmitted by the IWU, via functional interface CM<sub>3</sub>, to the SCF<sup>N</sup>. The encoding form again is agreed upon beforehand by the service provider and the network operator, as previously discussed. In a nineteenth step, the SCF<sup>N</sup> translates this instruction and transmits a DisconnectForwardConnection message (DFC) and/or a ReleaseCall message (RC) to the SSF<sup>N</sup>. In a twentieth step, the connection of the SSF<sup>N</sup> with the IWU and the SSF<sup>S</sup> is dropped (REL).

It will be clear to those skilled in the art that the scope of the present invention is not limited to the examples discussed above, but that various changes and modifications thereof are possible without deviating from the scope of the invention as defined in the appended Claims. In this regard, for example, it has been assumed in the discussion of the examples that the service provider has an Intelligent Network (standardised IN structure). Within the scope of the present invention, however, it is also possible that the service provider has an IN-like structure, for example a network in which the communication protocols deviate from the international standard. Further, it is for example possible that the third and fourth functional interfaces are integrated into a common functional interface.

#### CLAIMS

1. An infrastructure for data transmission, comprising:

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a network (N) with connection points (11, 12) for subscribers (A, B);

a service provider (SP) coupled to the network (N);

in which the network (N) comprises a service switching

5 function ( $SSF^N$ ) as well as a service control function ( $SCF^N$ ) for controlling the service switching function ( $SSF^N$ );

in which the service provider (SP) comprises a service switching function ( $SSF^S$ ) as well as a service control

10 function ( $SCF^S$ ) for controlling the service switching function ( $SSF^S$ );

in which the service control function ( $SCF^N$ ) of the network (N) has at its disposal a set of generic instructions which are available to the service control function ( $SCF^S$ ) of the

15 service provider (SP);

in which the service provider (SP) comprises an inter-working unit (IWU), said inter-working unit (IWU):

- being connected, via a first functional interface ( $CM_1$ ), to a service switching function ( $SSF^S$ ) of the  
20 service provider (SP), said first functional interface ( $CM_1$ ) being such that the inter-working unit (IWU), in the communication with the service switching function ( $SSF^S$ ) of the service provider (SP), behaves as service control function ( $SCF^S$ );

25 - being connected, via a second functional interface ( $CM_2$ ), to a service control function ( $SCF^S$ ) of the service provider (SP), said second functional interface ( $CM_2$ ) being such that the inter-working unit (IWU), in the communication with the service control function ( $SCF^S$ ) of  
30 the service provider (SP), behaves as service switching function;

- being connected, via a third functional interface ( $CM_3$ ), to a service control function ( $SCF^N$ ) of the network, and being connected, via a fourth functional interface

(CM<sub>4</sub>), to a service switching function (SSF<sup>N</sup>) of the network, said third and fourth functional interfaces (CM<sub>3</sub>, CM<sub>4</sub>) being such that the inter-working unit (IWU), in the communication with the service control function (SCF<sup>N</sup>) and  
5 the service switching function (SSF<sup>N</sup>), behaves as special resource function (SRF).

2. An infrastructure according to Claim 1, in which the service switching function (SSF<sup>S</sup>) of the service provider  
10 (SP) is arranged to transmit messages, destined for the service control function (SCF<sup>S</sup>) of the service provider (SP), via the first functional interface (CM<sub>1</sub>) to the inter-working unit (IWU), in which the inter-working unit (IWU) is arranged to forward said received messages,  
15 possibly after a suitable conversion, via the second functional interface (CM<sub>2</sub>) to the service control function (SCF<sup>S</sup>).

3. An infrastructure according to Claim 1 or 2, in which  
20 the service control function (SCF<sup>S</sup>) of the service provider (SP) is arranged to transmit commands, destined for the service switching function (SSF<sup>S</sup>) of the service provider (SP), via the second functional interface (CM<sub>2</sub>) to the inter-working-unit (IWU), in which the inter-working unit  
25 (IWU) is arranged to forward said received commands, possibly after a suitable conversion, via the first functional interface (CM<sub>1</sub>) to the service switching function (SSF<sup>S</sup>).

30 4. An infrastructure according to any of the preceding Claims, in which the service control function (SCF<sup>S</sup>) of the service provider (SP) is arranged to transmit commands, destined for the service switching function (SSF<sup>N</sup>) of the network (N), via the second functional interface (CM<sub>2</sub>), to

the inter-working unit (IWU), in which the inter-working unit (IWU) is arranged to forward said received commands, possibly after a suitable conversion, via the third functional interface (CM<sub>3</sub>) to the service control function (SCF<sup>N</sup>) of the network (N), and in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to translate the received information to a suitable command for the service switching function (SSF<sup>N</sup>) of the network (N) and to transmit said command to the service switching function (SSF<sup>N</sup>) of the network.

5. An infrastructure according to any of the preceding Claims, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to issue a command, upon reception of a certain triggering signal from a calling subscriber (A), to the service switching function (SSF<sup>N</sup>) of the network (N) to establish a temporary connection with the inter-working unit (IWU) of the service provider (SP) via the fourth functional interface (CM<sub>4</sub>); and in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to transmit an instruction, after establishing said temporary connection and after the reception of a response from the service control function (SCF<sup>S</sup>) of the service provider (SP), to the service control function (SCF<sup>S</sup>) of the service provider (SP).

6. An infrastructure according to Claim 5, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to interpret a reply, transmitted by the service control function (SCF<sup>S</sup>) of the service provider (SP) in response to said instruction either as the telephone number of a called subscriber, as a request for activating one or more DetectionPoints, or as a stop signal.

7. An infrastructure according to Claim 6, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if the said reply of the service control function (SCF<sup>S</sup>) of the service provider (SP) is interpreted  
5 as a stop signal, issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to drop the connection with the inter-working unit (IWU) of the service provider (SP) and to drop the connection with the calling subscriber (A).

10

8. An infrastructure according to Claim 6 or 7, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if the said reply of the service control function (SCF<sup>S</sup>) of the service provider (SP) is interpreted  
15 as the telephone number of a called subscriber (B) issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to drop the connection with the inter-working unit (IWU) of the service provider (SP) and to establish a connection with the called subscriber (B).

20

9. An infrastructure according to any of the Claims 6-8, in which the service control function (SCF<sup>N</sup>) of the network (N) is arranged to, if the said reply of the service control function (SCF<sup>S</sup>) of the service provider (SP) is  
25 interpreted as a request for activating one or more DetectionPoints, issue a command to the service switching function (SSF<sup>N</sup>) of the network (N) to switch on the related DetectionPoints and transmit a further instruction to the service control function (SCF<sup>S</sup>) of the service provider  
30 (SP).



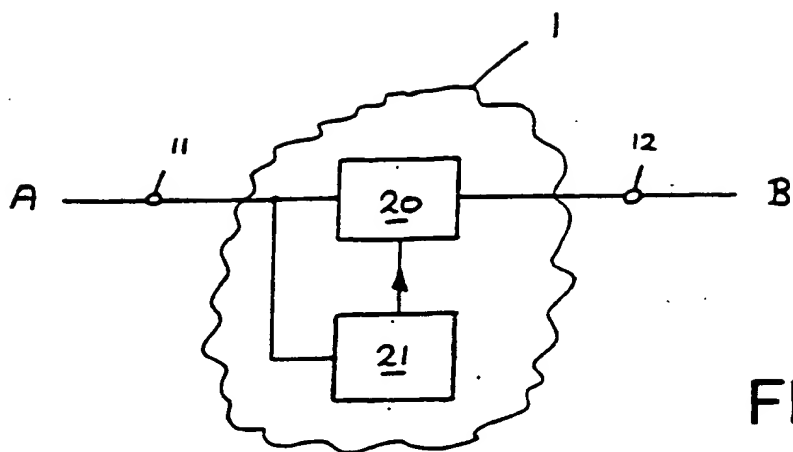


FIG. 1

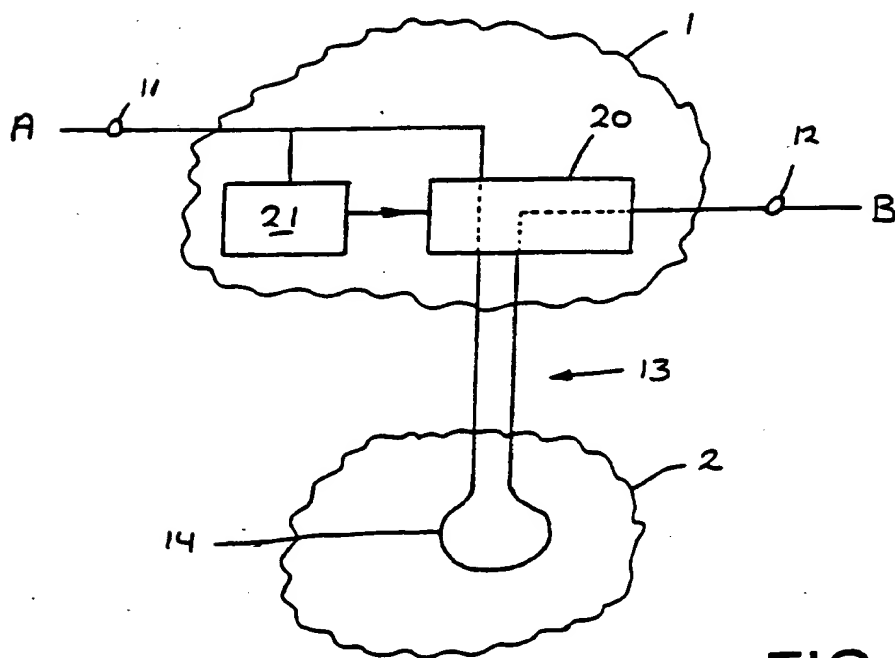


FIG. 2

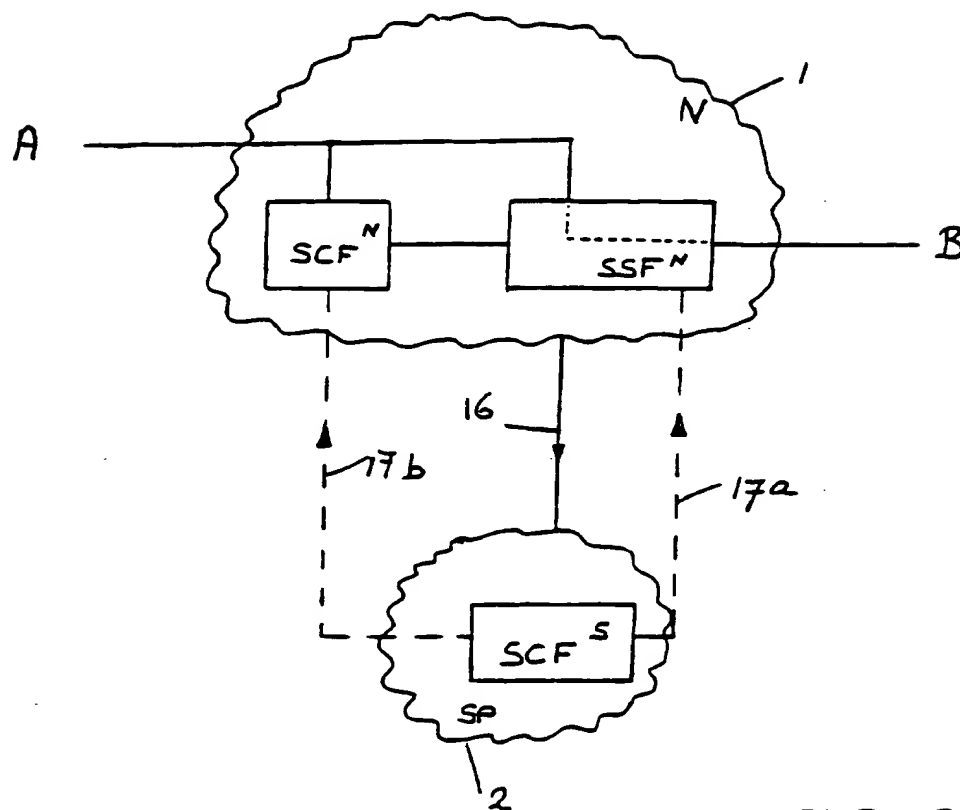


FIG. 3

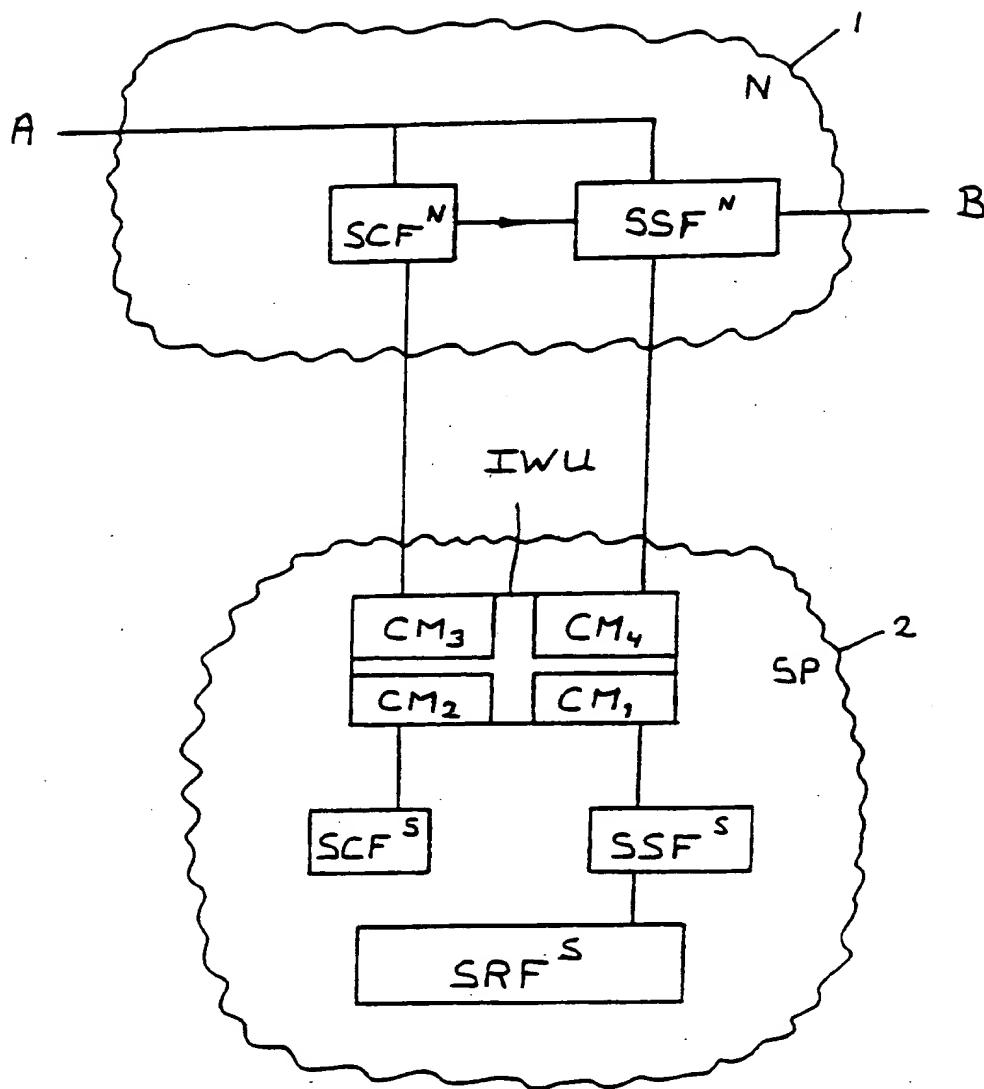
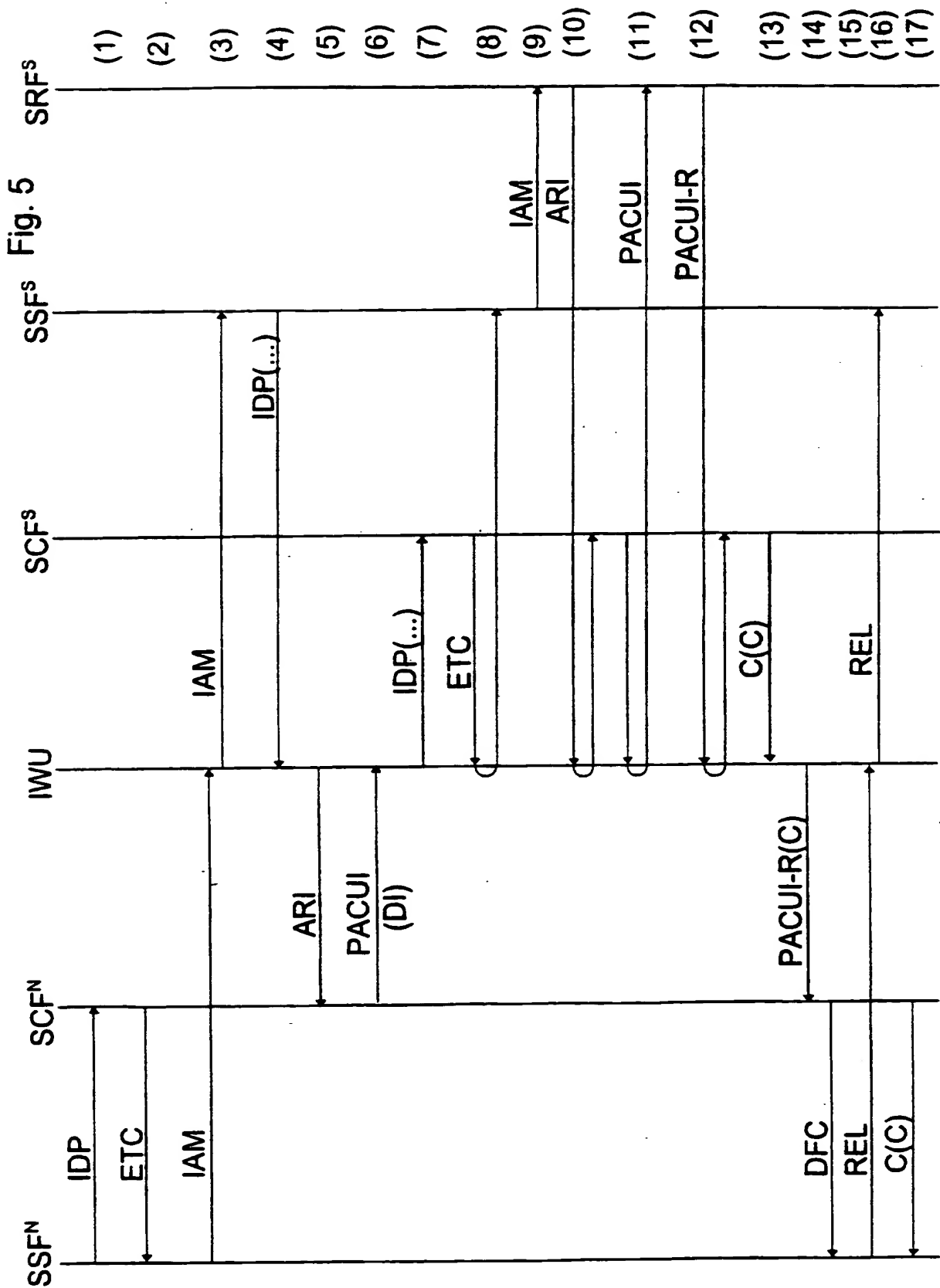
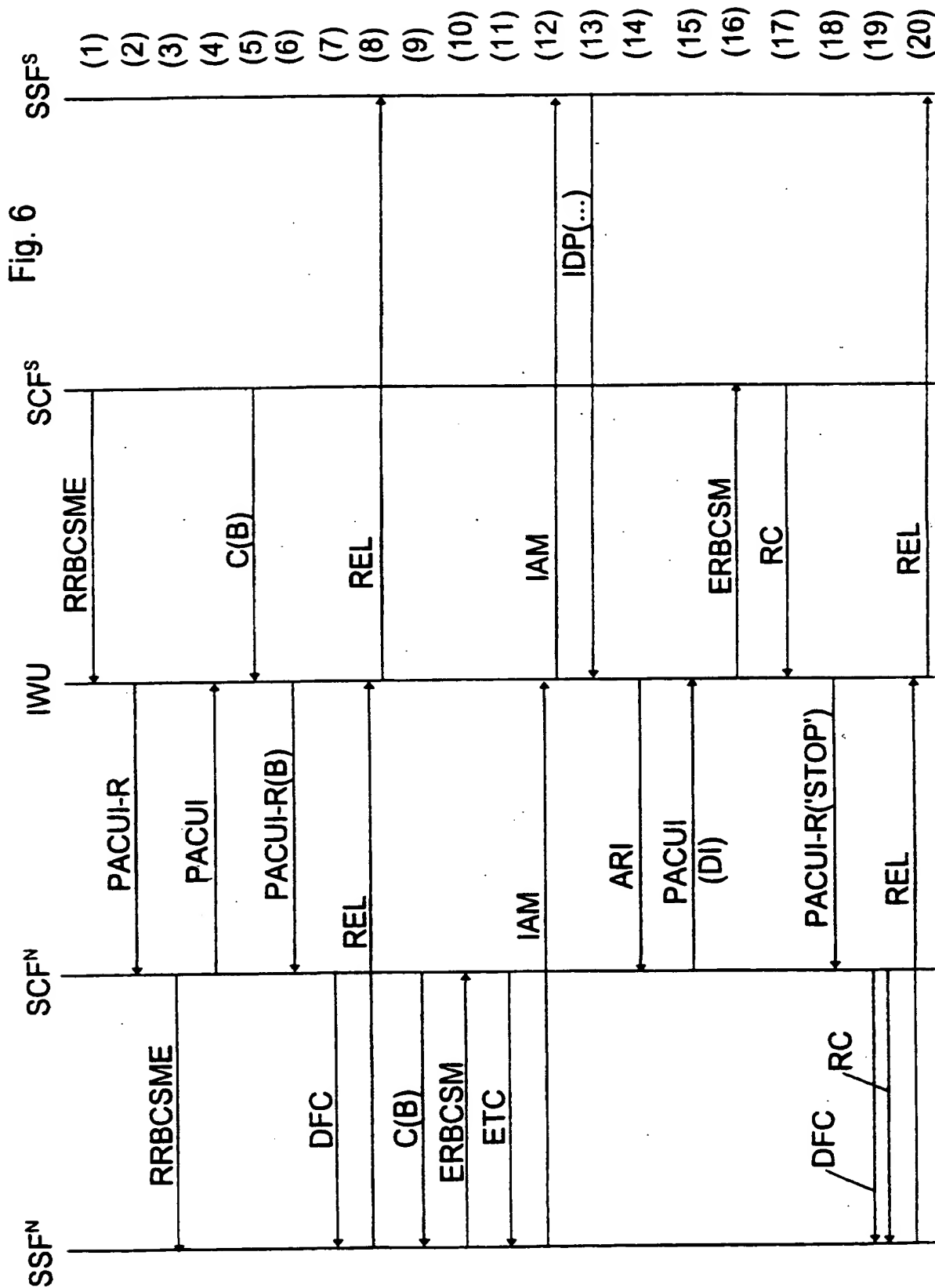


FIG. 4





## INTERNATIONAL SEARCH REPORT

Int. national Application No.

PCT/EP 99/07771

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 701 301 A (WEISSER JR FRANK J) 23 December 1997 (1997-12-23) column 8, line 19 -column 11, line 34 claims 1-46	1-9
A	US 5 430 719 A (WEISSER JR FRANK J) 4 July 1995 (1995-07-04) page 9, line 49 -page 14, line 22	1-9
A	EP 0 726 682 A (AT & T CORP) 14 August 1996 (1996-08-14) the whole document	1-9
A	WO 98 46030 A (ERICSSON GE MOBILE INC) 15 October 1998 (1998-10-15) page 3, line 1 - line 30 claims 1-19	1-9
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

18 April 2000

Date of mailing of the international search report

02/05/2000

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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